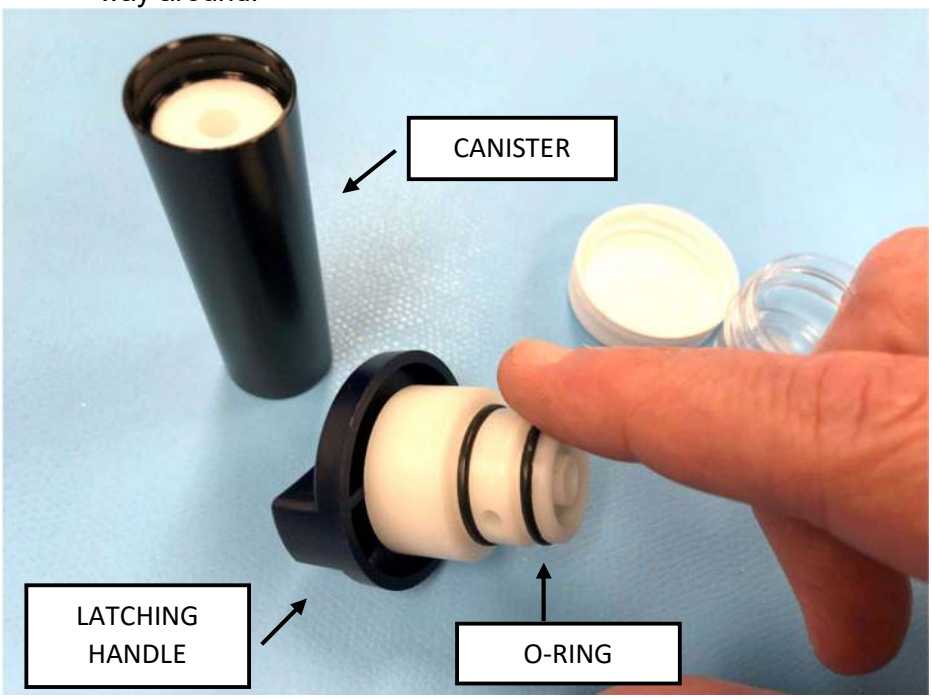
User-Performed Maintenance for AccuFIT 9000® & AccuFIT 9000®PRO

The AccuFIT 9000 series of products are precision instruments utilizing a finely-tuned optical bench which counts size-enhanced particulates using a pulsed laser beam, which is refracted by the shaped cloud of particulates passing through the beam at a known velocity. Any significant deviation in the behavioral dynamics of these sensing parameters affects the accuracy of the count, which in turn could lead to inaccurate fit tests. For this reason, we strongly discourage non-factory-trained personnel from opening the instrument itself and attempting any internal service. Doing so will void the warranty.

There are however several common-sense maintenance procedures that we *do* encourage users to perform. These are listed below:

1. **O-Ring Lubrication:** The wick assembly consists of a canister which holds the actual wick which is saturated with the isopropyl alcohol necessary for the particulate size enhancement. The canister is held onto the latching handle with a polymer O-ring. This O-ring should be periodically VERY LIGHTLY lubricated with the Dow-Corning DC4 lubricant included in the accessory kit. Separate the canister from the latching handle assembly by gently twisting the canister with one hand while holding the latching handle in the other. Touch your index finger to the DC4 lubricant and apply to the O-ring as shown. Rotate the latching handle assembly to ensure the O-ring is lubricated all the way around.



After applying the extremely light lubrication, reattach the canister to the latching handle by rotating the canister while gently pushing onto the O-ring. Continue turning the canister 360° to ensure that the O-ring has not become pinched or distorted during reassembly.

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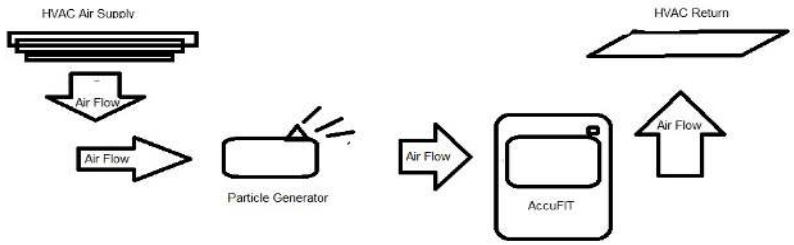
2. **Particle Generation Notes:** Modern HVAC (Heating, Ventilation, and Air Conditioning) systems are becoming increasingly effective at particulate removal, which is very good for the people who work in buildings with these newer, more efficient HVAC systems, but which proves problematic for particulate-based respirator fit testing.

   Since the device needs to have a sufficient quantity of particles present in the ambient atmosphere, it is very often necessary to generate particulates in order to have a statistically meaningful ratio between the concentration of particulates in the ambient atmosphere and the particulates measured in the respirator breathing zone.

   The AccuFIT 9000 PRO model has the ability to discard all particles except those we know are 100% stopped by the filter media that is used in N95 and FFP 1, 2, and 3 respirators. We typically see 3000-5000 particles/cc in ambient air before the classifier is actuated (which is controlled by software associated with the selected entry in the Respirator database), and afterwards see only 200-400 in this 'N95' mode. This works perfectly well for testing the filtering facepieces, *and the user is cautioned not to attempt to achieve a higher concentration by running the particle generator harder or for extended periods of time*. Pay close attention to the airflow in the room in which the fit testing is to occur. Please refer to the diagram below:



   The AccuFIT 9000 series of Fit Test Instruments uses an aerodynamically precise, very small orifice in order to shape the cloud of enhanced particulates which passes through the laser beam. *This orifice can become clogged if the ambient concentration of generated particulates is extremely high or if the generator is situated too close to the AccuFIT inlet tube*. This is because the aerosols expelled by the generator are mostly water that must be completely evaporated (leaving only tiny, dry crystals of the dissolved mineral as the challenge agents) before they enter the AccuFIT. Entrained water will cause the particulates to impact the rim of the guide nozzle orifice and can lead to the formation of a "stalactite" which will eventually obstruct the orifice. If this happens, the particle count will go to zero, and the optical bench must then be disassembled by a trained technician at an Authorized Service Facility who can properly clean and re-align the unit.

   The key thing to remember is that the particle generator should be as far away from the inlet of the AccuFIT as possible- typically 10 feet.

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3. **Sample Line:** It is possible for moisture to condense in the sample line, and *we recommend removing the twin tubing from the instrument and flushing the line with 2 or 3 ml of alcohol after a day of fit testing.* The main concern here is that opportunistic bacterial growth could occur if the tubes are stored for some time with moisture allowed to remain on the interior surfaces of the sample line.

4. **Zero Filter:** When the instrument is left in the "ON" mode and no fit testing is occurring, *we strongly recommend that the zero filter (a bluish plastic capsule 4 cm X 2 cm) be attached to the inlet of the clear sample line*. This prevents excessive buildup at the guide nozzle orifice.

5. **Remove wick assembly when instrument not powered on:** *The wick assembly should never be left in the unit when it is not in operation*. If the Wick assembly is left in the unit when not in operation alcohol can drip into the optics bench and may require disassembly and cleaning. This is especially important if the instrument is to be transported from one location to another.

6. **Alcohol dilution:** The alcohol used in the Condensation Nuclei Counting (CNC) instrument is reagent grade 2-propanol, also known as isopropyl alcohol. *The purity should be at least 99% for the most efficient operation.*

   Because human exhaled breath contains moisture, and the particle generator creates a greater humidity in the room where fit testing is occurring, it is possible that this extra humidity can dilute the alcohol contained in the wick if a large number of fit tests have been performed. Should this happen, the user may see a "Low Alcohol Warning" message even though the wick assembly has recently been recharged in the wick capsule. If this message appears even after the wick has been soaked in the alcohol, the wick itself should be replaced by a spare wick (included with the unit in the accessory kit). The water-contaminated wick which has been removed from the wick assembly should not be discarded, but should be allowed to dry, which will usually permit the wick to be reused. The water-contaminated alcohol in the Wick Capsule should be replaced with fresh alcohol, and the new wick assembly should be immersed in the fresh alcohol for at least 5 minutes before reinsertion into the AccuFIT 9000 PRO. Please refer to "**O-ring Lubrication**" for instructions for separating canister and Latching handle.

7. **Level Surface:** The user should ensure that the AccuFIT 9000 PRO is operated on a level surface. This is because the CNC engine is designed to allow the condensed (and thus liquid) alcohol to exit the condenser and return to the wick assembly during operation. Tilting the instrument can allow liquid alcohol to enter the optics bench. If this were to happen, usually operating the instrument for an hour or so with no wick in place is sufficient to evaporate the alcohol which has entered into the optics bench, but if a truly excessive contamination has occurred, disassembly may be required and this must be performed by a trained technician at an Authorized Service Facility.

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8. **The Validation Check:** This is a very important part of the fit testing routine. This check ensures that the operator is confident that the AccuFIT 9000 PRO is operating within optimal parameters and that the fit test results obtained will be accurate and valid. The Validation Check consists of the following steps:

    a. The ambient concentration of the particulates is measured by drawing a sample through the Sample Line. If this count exceeds the minimum threshold required to perform a fit test the instrument indicates a “Pass” value and asks the user to place the Zero Filter on the clear sample line.
    b. When the Zero Filter is placed on the clear Sample Tube the count should go to zero, thereby showing that there are no leaks in the system which could cause erroneous fit test results.
    c. The MAC valve is then actuated which switches the flow from Sample to Ambient (blue line). This value should be the same as the initial count through the sample line thus indicating that the valve has performed properly.
    d. The MAC valve then switches back to the Sample line (the Zero Filter being still attached) and makes another count after it has allowed time to sweep all of the particulates from the system. This shows that the valve operates properly in both directions and does not allow any cross-port leakage.
    e. The instrument then calculates the Maximum Fit Factor achieved and saves these data in the database with the serial number of the instrument and the date and time of Validation Check. This allows future reference if there are any questions concerning instrument performance in future.

With a reasonable level of care and full awareness of the aforementioned characteristics of proper use conditions, the AccuFIT 9000® and AccuFIT 9000®PRO will perform many thousands of respirator fit tests accurately and reliably, providing fully compliant and traceable results with relative ease and speed.

Should any questions remain, or further guidance is needed, please do not hesitate any of our technical support staff who will gladly help you with the user maintenance operations illustrated in this guide - and thank you for being part of the AccuTec-IHS family of users.

-Bill Hill, Chief Technical Officer, AccuTec-IHS, Inc.

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